

CLAIMS:

What is claimed is:

1. An organic electroluminescent display device comprising:  
a substrate;  
a first electrode and a second electrode formed on the substrate; and  
a plurality of organic film layers between the first and second electrodes, comprising:  
an emitting layer,  
a first organic film layer provided between the emitting layer and the second electrode, and  
a second organic film layer provided between the emitting layer and the first organic film layer,  
wherein the first organic film layer comprises a first organic metal complex compound, and the second organic film layer comprises a mixture of a charge carrier transport material and a second organic metal complex compound.
2. The organic electroluminescent display device according to claim 1, wherein a charge carrier of the charge carrier transport material is an electron.
3. The organic electroluminescent display device according to claim 1, wherein the charge carrier transport material comprises at least one material selected from the group consisting of a polycyclic hydrocarbon series derivative, a heterocyclic compound, and derivatives thereof.
4. The organic electroluminescent display device according to claim 1, wherein the first and second organic metal complex compounds each comprise at least one metal selected from the group consisting of an alkali metal, an alkali earth metal, and a rare earth metal.
5. The organic electroluminescent display device according to claim 4, wherein the first and second organic metal complex compounds comprise the same metal.

6. The organic electroluminescent display device according to claim 1, wherein the thickness of the first organic film layer is 10 nm or less.

7. The organic electroluminescent display device according to claim 1, wherein the thickness of the first organic film layer is 0.5 to 10 nm.

8. The organic electroluminescent display device according to claim 1, wherein the thickness of the second organic film layer is 10 nm or less.

9. The organic electroluminescent display device according to claim 1, wherein the second organic film layer comprises 75 % or less of the charge carrier transport material.

10. The organic electroluminescent display device according to claim 1, wherein the first and second organic metal complex compounds each comprise one compound selected from the group consisting of tris(8-quinolinolato)aluminum and 8-quinolinolato lithium, comprising one or more 8-quinolinolatos as a ligand, and derivatives thereof.

11. The organic electroluminescent display device according to claim 1, further comprising a hole retardation layer.

12. The organic electroluminescent display device according to claim 1, wherein the first electrode is an anode, and the second electrode is a cathode comprised of at least one metal selected from the group of Al, Ag, Yt, and metal halide.

13. The organic electroluminescent display device according to claim 1, wherein the mixture of the charge carrier transport material and the second organic metal complex compound is formed through a solution process.

14. The organic electroluminescent display device according to claim 1, wherein the mixture of the charge carrier transport material and the second organic metal complex compound is formed by co-depositing the charge carrier transport material and the second organic metal complex compound under a vacuum so that the two materials are mixed.

15. The organic electroluminescent display device according to claim 1, wherein the first organic film layer is positioned adjacent to the second electrode.

16. An organic electroluminescent display device comprising;  
a substrate;  
a first electrode and a second electrode formed on the substrate;  
a first layer comprising a metal halide, contacted with the second electrode; and  
a second layer comprising a mixture of a charge carrier transport material and an organic metal complex compound, deposited under the first layer.

17. The organic electroluminescent display device according to claim 16, wherein a charge carrier of the charge carrier transport material is an electron.

18. The organic electroluminescent display device according to claim 16, wherein the charge carrier transport material comprises at least one material selected from the group consisting of a polycyclic hydrocarbon series derivative, a heterocyclic compound, and derivatives thereof.

19. The organic electroluminescent display device according to claim 16, wherein the organic metal complex compound and the metal halide each comprises at least one metal selected from the group consisting of an alkali metal, an alkali earth metal, and a rare earth metal.

20. The organic electroluminescent display device according to claim 16, wherein the thickness of the first layer is 10 nm or less.

21. The organic electroluminescent display device according to claim 16, wherein the thickness of the first layer is 0.5 to 10 nm.

22. The organic electroluminescent display device according to claim 16, wherein the thickness of the second layer is 10 nm or less.

23. The organic electroluminescent display device according to claim 16, wherein the organic metal complex compound in the second layer comprises 75 % or less of the mixture of the charge carrier transport material and the organic metal complex compound.

24. The organic electroluminescent display device according to claim 16, wherein the organic metal complex compound of the second layer is one compound selected from the group consisting of tris(8-quinolinolato)aluminum and 8-quinolinolato lithium, comprising one or more 8-quinolinolatos as a ligand, and derivatives thereof.

25. The organic electroluminescent display device according to claim 16, further comprising a hole retardation layer.

26. An organic electroluminescent display device comprising:  
a bi-layer electron injection structure comprising:  
a first organic film layer comprising a first organic metal complex compound;  
and

a second organic film layer comprising a second organic metal complex compound mixed with an electron transport material.

27. An organic electroluminescent display device comprising:  
an electron transport layer;  
wherein the electron transport layer is a mixture of an organic metal complex compound and an existing electron transport layer.